

Shock and Vibration Courses

4.0 CONTROLLED INPUT ROAD COURSE

The Controlled Input Road Course (Test Area 7) is located adjacent to the Redstone Arsenal Airfield near the northwestern boundary of Redstone Arsenal, AL (Figures 4.0-1 and 4.0-2). This course was designed to allow the tester to subject a test vehicle to standardized road test hazards and obstacles. In addition, the tester can monitor and record specific shock and vibration inputs to a test vehicle and associated vehicle and missile system components to allow for laboratory vibration schedule development and/or six-degree-of-freedom (6-DOF) motion replication for future laboratory testing.

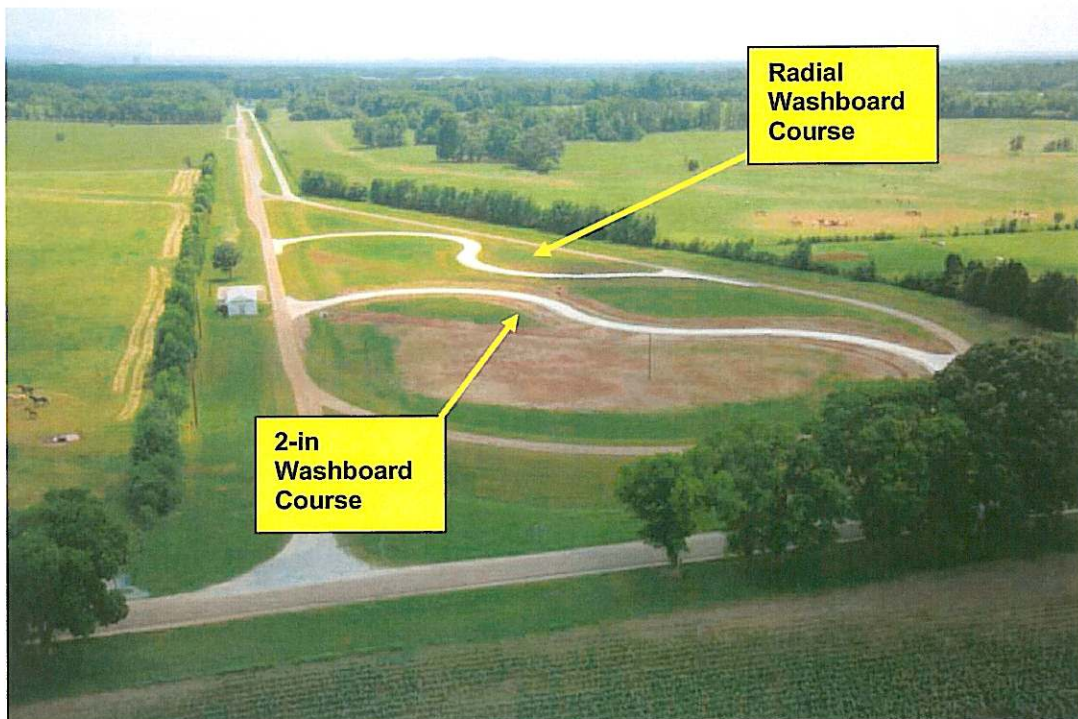


Figure 4.0-1. Aerial View of the 2-in Washboard and Radial Washboard Courses

4.1 Two-Inch Washboard

The two-inch washboard course is a 470 foot, serpentine course consisting of concrete bumps, two inches high and spaced two feet apart. This surface will impart severe periodic vibration on the test vehicle dependent on the road speed and is intended for wheeled vehicles. Although not intended to represent a specific terrain, the surface does replicate the washboard characteristics experienced on poorly maintained secondary roads and off-road trails due to erosion and water washouts.

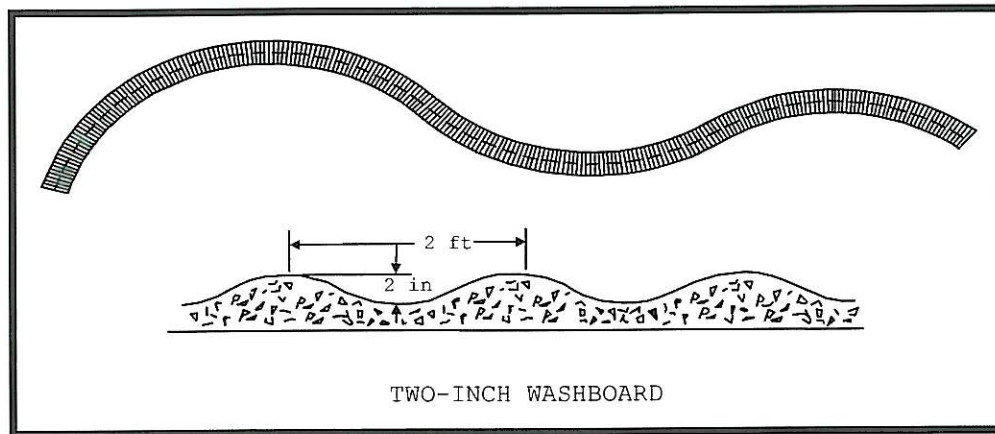


Figure 4.1-1. Two-Inch Washboard



Figure 4.1-2. HMMWV on Two-Inch Washboard

4.2 Radial Washboard

This segment of the road course consists of concrete bumps spaced randomly along a shaped course of approximately 275 feet. The bumps are random in height from 2 to 4 inches and randomly spaced from 1 to 5 feet. This surface will impart severe random vibration of the test vehicle dependent on the road speed and is intended for wheeled vehicles.

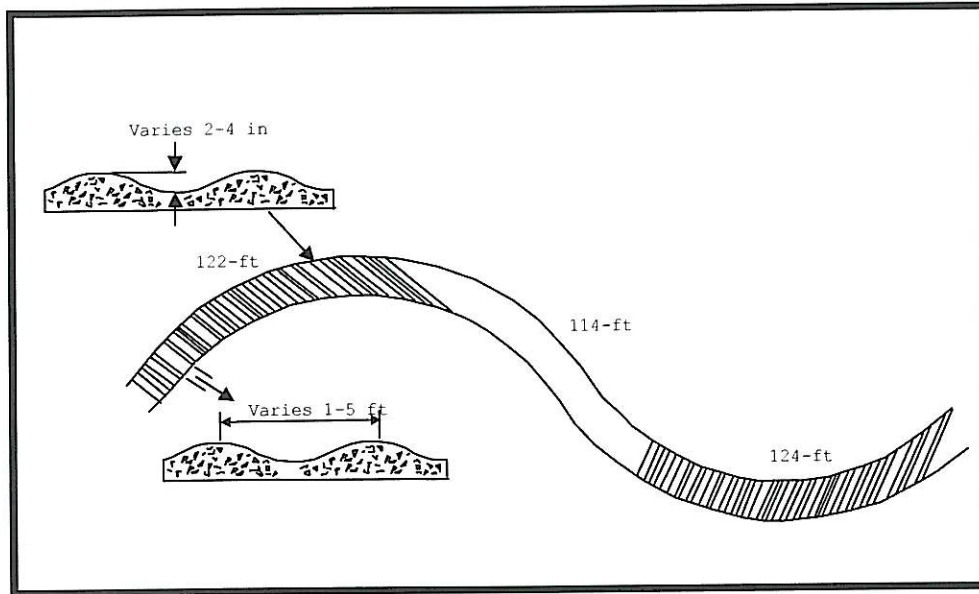


Figure 4.2-1. Radial Washboard

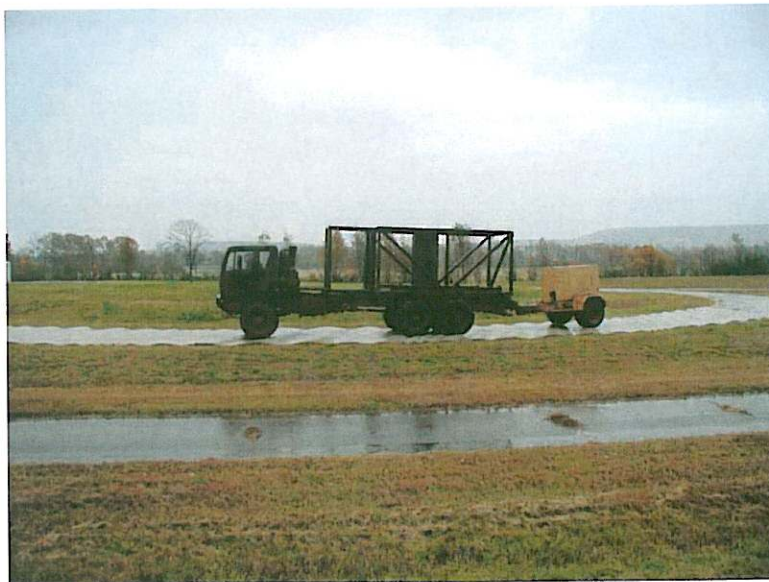


Figure 4.2-2. FMTV on Radial Washboard

4.3 Six-inch Washboard

The six-inch washboard is a concrete sine wave, six inches at its peak highest point (peak-to-peak), six feet between peaks and 400 feet long. At slow speeds, this course induces low-frequency, sinusoidal vibration to wheeled vehicles fully exercising the vehicle's suspension. At higher speeds, this test surface induces pitching and rhythmic transient vibrations to the vehicle.

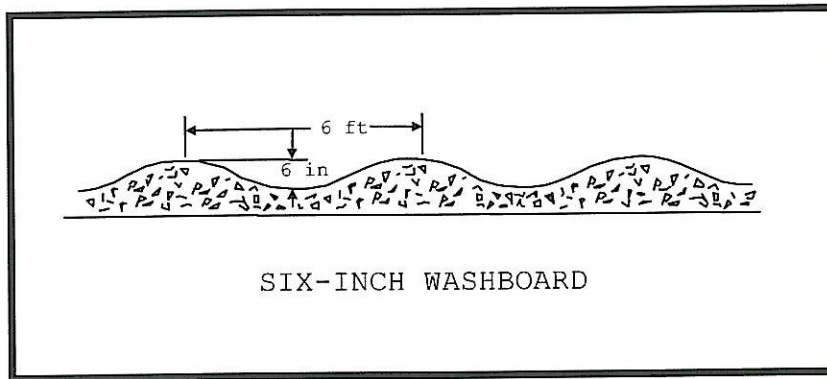


Figure 4.3-1. Six-Inch Washboard



Figure 4.3-2. Missile Launcher on Six-Inch Washboard Course

4.4 Belgian Block (Cobblestone)

The Belgian Block course consists of unevenly-laid granite blocks forming an undulating surface which creates a random vibration on wheeled vehicles. The course is approximately 500 feet long and represents or duplicates the rough cobblestone roads found in many parts of the world.

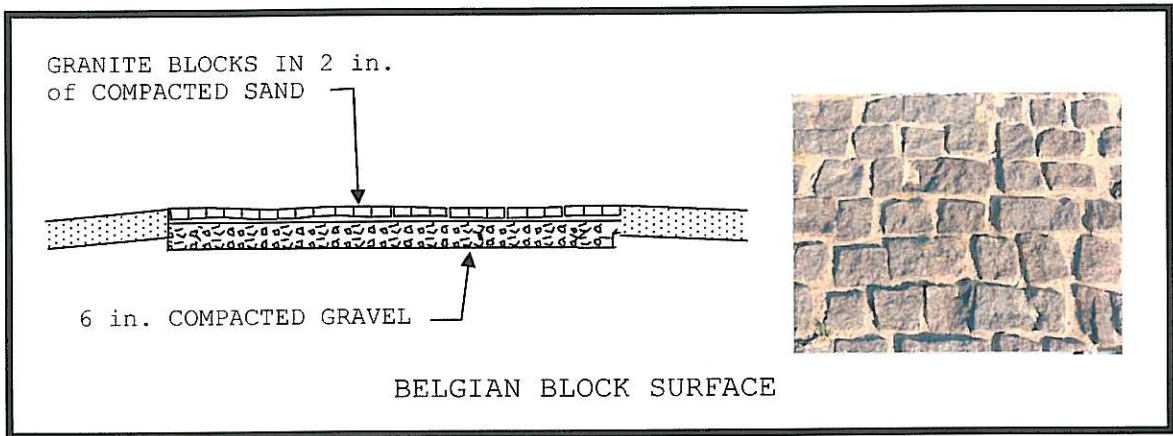


Figure 4.4-1. Belgian Block Surface



Figure 4.4-2. HMMWV with Trailer on Belgian Block Course

4.5 Embedded Rock

This course segment represents the surface which might be found in creek beds or off-road in mountainous regions. It is an extremely rough surface and a severe test of the vehicle. The motion imparted to the vehicle will be random in nature. The course is approximately 200 feet of granite rock embedded in concrete and is intended for wheeled vehicles.

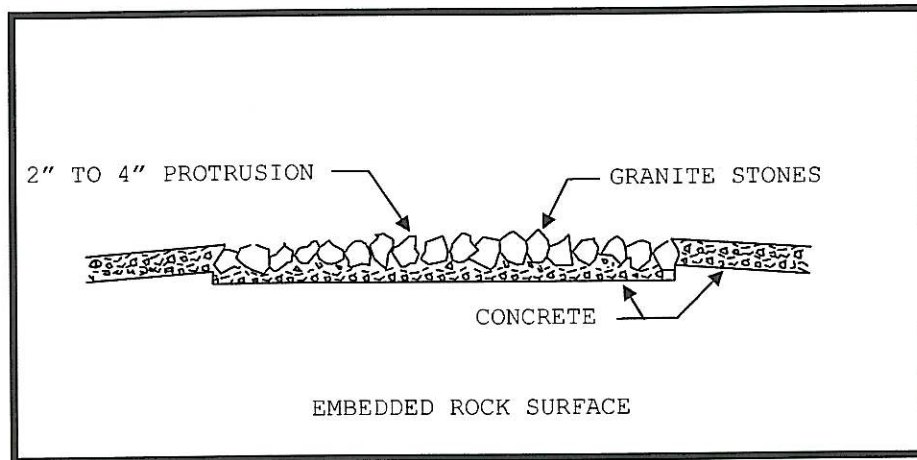


Figure 4.5-1. Embedded Rock Surface



Figure 4.5-2. Missile Transporter on Embedded Rock